

General

Guideline Title

Guidelines of care for the management of acne vulgaris.

Bibliographic Source(s)

Zaenglein AL, Pathy AL, Schlosser BJ, Alikhan A, Baldwin HE, Berson DS, Bowe WP, Graber EM, Harper JC, Kang S, Keri JE, Leyden JJ, Reynolds RV, Silverberg NB, Stein Gold LF, Tollefson MM, Weiss JS, Dolan NC, Sagan AA, Stern M, Boyer KM, Bhushan R. Guidelines of care for the management of acne vulgaris. J Am Acad Dermatol. 2016 May;74(5):945-73.e33. [315 references] [PubMed](#)

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Strauss JS, Krowchuk DP, Leyden JJ, Lucky AW, Shalita AR, Siegfried EC, Thiboutot DM, Van Voorhees AS, Beutner KA, Sieck CK, Bhushan R, American Academy of Dermatology/American Academy of Dermatology. Guidelines of care for acne vulgaris management. J Am Acad Dermatol. 2007 Apr;56(4):651-63. [180 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Level of evidence grades (I-III) and strength of recommendations (A-C) are defined at the end of the "Major Recommendations" field.

Strength of Recommendations for the Management and Treatment of Acne Vulgaris

Recommendation	Strength of Recommendation	Level of Evidence	References
Grading/classification system	B	II, III	Tan et al., 2007; Mallon et al., 1999; Gupta, Johnson, & Gupta, 1998; Lasek & Chren, 1998; Martin et al., 2001; Rapp et al., 2006; Dréno et al., 2007; Pochiet al., 1991; Doshi, Zaheer, & Stiller, 1997; Lucky et al., 1996; Cook, Centner, & Michaels, 1979; Burke & Cunliffe, 1984; Allen & Smith, 1982; Dréno et al., 2011;

Recommendation	Strength of Recommendation	Level of Evidence	References
			Hayashi, Akamatsu, & Kawashima, 2008; Hayashi et al., 2008; Tan et al., 2012; Tan et al., 2013; Beylot et al., 2010; Tan, Fung, & Bulger, 2006; Bergman et al., 2009; Min et al., 2013; Qureshi et al., 2006; Choi et al., 2012; Choi et al., 2011; Dobrev, 2010; Choi, Choi, & Youn, 2013; Kim et al., 2006; Xhaufaire-Uhoda & Piérard, 2007; Youn et al., 2013; Youn et al., 2009; Zane et al., 2008
Microbiologic testing	B	II, III	Cove, Cunliffe, & Holland, 1980; Mourelatos et al., 2007; Shaheen & Gonzalez, 2011; Fitz-Gibbon et al., 2013; Holland et al., 2010; Lomholt & Kilian, 2010; Miura et al., 2010; Tochio et al., 2009; Tomida et al., 2013
Endocrinologic testing	B	I, II	Lucky et al., 1997; Bunker et al., 1989; Lawrence et al., 1981; Timpatanapong & Rojanasakul, 1997; Lucky, 1983; Lucky et al., 1983; Abulnaja, 2009; Arora, Seth, & Dayal, 2010
Topical Therapies			
Benzoyl peroxide	A	I, II	Fyrand & Jakobsen, 1986; Mills et al., 1986; Schutte, Cunliffe, & Forster, 1982
Topical antibiotics (e.g., clindamycin and erythromycin)	A	I, II	Mills et al., 2002; Bernstein & Shalita, 1980; Jones & Crumley, 1981; Shalita, Smith, & Bauer, 1984; Leyden et al., 1987; Kuhlman & Callen, 1986; Becker et al., 1981
Combination of topical antibiotics and benzoyl peroxide	A	I	Leyden et al., 2001; Lookingbill et al., 1997; Tschén et al., 2001
Topical retinoids (e.g., tretinoin, adapalene, and tazarotene)	A	I, II	Krishnan, 1976; Bradford & Montes, 1974; Shalita et al., 1999; Shalita et al., 1996; Cunliffe et al., 1997; Richter et al., 1998; Zouboulis et al., 2000; Christiansen et al., 1974; Dunlap et al., 1998; Kakita, 2000; Webster et al., 2001; Galvin et al., 1998
Combination of topical retinoids and benzoyl peroxide/topical antibiotic	A	I, II	Richter et al., 1998; Zouboulis et al., 2000
Azelaic acid	A	I	Cunliffe & Holland, 1989; Katsambas, Graupe, & Stratigos, 1989
Dapsone	A	I, II	Draelos et al., 2007; Lucky et al., 2007; Tanghetti, Harper, & Oefelein, 2012
Salicylic acid	B	II	Shalita, 1981
Systemic Antibiotics			
Tetracyclines (e.g., tetracycline, doxycycline, and minocycline)	A	I, II	Garner et al., 2012; Leyden et al., 2013; Lebrun-Vignes et al., 2012; Kermani et al., 2012
Macrolides (e.g., azithromycin and erythromycin)	A	I	Rafiei & Yaghoobi, 2006
Trimethoprim (with or without sulfamethoxazole)	B	II	Jen, 1980; Fenner, Wiss & Levin, 2008
Limiting treatment duration and concomitant/maintenance topical therapy	A	I, II	Gold et al., 2010; Leyden et al., 2006; Margolis et al., 2010

Hormonal Agents Recommendation	Strength of Recommendation	Level of Evidence	References
Combined oral contraceptives			Lucky et al., 2008; Maloney et al., 2008; Maloney et al., 2009; Plewig et al., 2009
Spironolactone	B	II, III	Shaw, 2000; Sato et al., 2006
Flutamide	C	III	Wang, Wang, & Soong, 1999; Castelo-Branco et al., 2009
Oral corticosteroids	B	II	Nader et al., 1984
Isotretinoin			
Conventional dosing	A	I, II	Amichai, Shemer, & Grunwald, 2006; Goldstein et al., 1982; Jones et al., 1983; Layton et al., 1993; Lehucher-Ceyrac & Weber-Buisset, 1993; Peck et al., 1982; Rubinow et al., 1987; Stainforth et al., 1993; Strauss et al., "A randomized trial," 2001; Strauss et al., 1984; Strauss & Stranieri, 1982; Goldsmith et al., 2004; Lehucher-Ceyrac et al., 1999; Strauss et al., "Safety," 2001; Webster, Leyden, & Gross, 2013; Alhusayen et al., 2013; Crockett et al., 2009; Crockett et al., 2010; Etminan et al., 2013; Reddy et al., 2006; Sundstrom et al., 2010; Bozdog et al., 2009; Chia et al., 2005; Cohen, Adams, & Patten, 2007; Jick, Kremers, & Vasilakis-Scaramozza, 2000; Nevoralová & Dvoráková, 2013; Rehn et al., 2009
Low-dose treatment for moderate acne	A	I, II	Agarwal, Besarwal, & Bhola, 2011; Akman et al., 2007; Borghi et al., 2011; Kaymak & Ilter, 2006; Lee et al., 2011
Monitoring	B	II	Leachman et al., 1999; Bershad et al., 1985; De Marchi et al., 2006; Zech et al., 1983
iPLEDGE and contraception	A	II	Shin et al., 2011; Collins et al., 2014
Miscellaneous Therapies and Physical Modalities			
Chemical peels	B	II, III	Grover & Reddu, 2003; Dréno et al., 2011; Ilknur et al., 2010
Intralesional steroids	C	III	Levine & Rasmussen, 1983; Potter, 1971
Complementary and alternative therapies (e.g., tea tree oil, herbal, and biofeedback)	B	II	Bassett, Pannowitz, & Barnetson, 1990; Enshaieh et al., 2007; Fouladi, 2012; Hunt & Barnetson, 1992; Lalla et al., 2001; Paranjpe & Kulkarni, 1995; Hughes et al., 1983
Role of Diet in Acne			
Effect of glycemic index	B	II	Smith et al., 2007; Kwon et al., 2012; Smith et al., 2008; Preneau et al., 2013; Ismail, Manaf, & Azizan, 2012
Dairy consumption	B	II	Adebamowo et al., 2006; Adebamowo et al., 2008; Di Landro et al., 2012

Recommendations for Grading and Classification of Acne

Clinicians may find it helpful to use a consistent classification/grading scale (encompassing the numbers and types of acne lesions as well as disease severity, anatomic sites, and scarring) to facilitate therapeutic decisions and assess response to treatment.

Currently, no universal acne grading/classifying system can be recommended.

Recommendations for Microbiologic and Endocrinologic Testing

Routine microbiologic testing is unnecessary in the evaluation and management of patients with

acne. Those who exhibit acne-like lesions suggestive of gram-negative folliculitis may benefit from microbiologic testing.

Routine endocrinologic evaluation (e.g., for androgen excess) is not indicated for the majority of patients with acne. Laboratory evaluation is recommended for patients who have acne and additional signs of androgen excess.

Recommendations for Topical Therapies

Benzoyl peroxide or combinations with erythromycin or clindamycin are effective acne treatments and are recommended as monotherapy for mild acne, or in conjunction with a topical retinoid, or systemic antibiotic therapy for moderate to severe acne.

Benzoyl peroxide is effective in the prevention of bacterial resistance and is recommended for patients on topical or systemic antibiotic therapy.

Topical antibiotics (e.g., erythromycin and clindamycin) are effective acne treatments, but are not recommended as monotherapy because of the risk of bacterial resistance.

Topical retinoids are important in addressing the development and maintenance of acne and are recommended as monotherapy in primarily comedonal acne, or in combination with topical or oral antimicrobials in patients with mixed or primarily inflammatory acne lesions.

Using multiple topical agents that affect different aspects of acne pathogenesis can be useful. Combination therapy should be used in the majority of patients with acne.

Topical adapalene, tretinoin, and benzoyl peroxide can be safely used in the management of preadolescent acne in children.

Azelaic acid is a useful adjunctive acne treatment and is recommended in the treatment of postinflammatory dyspigmentation.

Topical dapsone 5% gel is recommended for inflammatory acne, particularly in adult females with acne.

There is limited evidence to support recommendations for sulfur, nicotinamide, resorcinol, sodium sulfacetamide, aluminum chloride, and zinc in the treatment of acne.

Recommendations for Systemic Antibiotics

Systemic antibiotics are recommended in the management of moderate and severe acne and forms of inflammatory acne that are resistant to topical treatments.

Doxycycline and minocycline are more effective than tetracycline, but neither is superior to each other.

Although erythromycin and azithromycin can be effective in treating acne, its use should be limited to those who cannot use the tetracyclines (i.e., pregnant women or children <8 years of age).

Erythromycin use should be restricted because of its increased risk of bacterial resistance.

Use of systemic antibiotics, other than the tetracyclines and macrolides, is discouraged because there are limited data for their use in acne. Trimethoprim-sulfamethoxazole and trimethoprim use should be restricted to patients who are unable to tolerate tetracyclines or in treatment-resistant patients.

Systemic antibiotic use should be limited to the shortest possible duration. Re-evaluate at 3 to 4 months to minimize the development of bacterial resistance. Monotherapy with systemic antibiotics is not recommended.

Concomitant topical therapy with benzoyl peroxide or a retinoid should be used with systemic antibiotics and for maintenance after completion of systemic antibiotic therapy.

Recommendations for Hormonal Agents

Estrogen-containing combined oral contraceptives are effective and recommended in the treatment of acne in females.

Spironolactone is useful in the treatment of acne in select females.

Oral corticosteroid therapy can be of temporary benefit in patients who have severe inflammatory acne while starting standard acne treatment.

In patients who have well-documented adrenal hyperandrogenism, low-dose oral corticosteroids are

recommended in treatment of acne.

See Table VIII in the original guideline document for the World Health Organization recommendations for combined oral contraceptive usage eligibility.

Recommendations for Isotretinoin

Oral isotretinoin is recommended for the treatment of severe nodular acne.

Oral isotretinoin is appropriate for the treatment of moderate acne that is treatment-resistant or for the management of acne that is producing physical scarring or psychosocial distress.

Low-dose isotretinoin can be used to effectively treat acne and reduce the frequency and severity of medication-related side effects. Intermittent dosing of isotretinoin is not recommended.

Routine monitoring of liver function tests, serum cholesterol, and triglycerides at baseline and again until response to treatment is established is recommended. Routine monitoring of complete blood count is not recommended.

All patients treated with isotretinoin must adhere to the iPLEDGE risk management program.

Females of child-bearing potential taking isotretinoin should be counseled regarding various contraceptive methods including user-independent forms.

Prescribing physicians also should monitor their patients for any indication of inflammatory bowel disease and depressive symptoms and educate their patients about the potential risks with isotretinoin.

Recommendations for Miscellaneous Therapies and Physical Modalities

There is limited evidence to recommend the use and benefit of physical modalities for the routine treatment of acne, including pulsed dye laser, glycolic acid peels, and salicylic acid peels.

Intralesional corticosteroid injections are effective in the treatment of individual acne nodules.

Recommendation for Complementary/Alternative Therapies

Herbal and alternative therapies have been used to treat acne. Although most of these products appear to be well tolerated, limited data exist regarding the safety and efficacy of these agents to recommend their use in acne.

Recommendations for the Role of Diet in Acne

Given the current data, no specific dietary changes are recommended in the management of acne.

Emerging data suggest that high glycemic index diets may be associated with acne.

Limited evidence suggests that some dairy, particularly skim milk, may influence acne.

Definitions

Levels of Evidence

Good-quality patient-oriented evidence (i.e., evidence measuring outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction, and quality of life)

Limited-quality patient-oriented evidence

Other evidence, including consensus guidelines, opinion, case studies, or disease-oriented evidence (i.e., evidence measuring intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes)

Strength of Recommendations

Recommendation based on consistent and good quality patient-oriented evidence

Recommendation based on inconsistent or limited quality patient-oriented evidence

Recommendation based on consensus, opinion, case studies, or disease-oriented evidence

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Acne vulgaris

Note: This guideline does not examine the treatment of acne sequelae (e.g., scarring or postinflammatory dyschromia).

Guideline Category

Evaluation

Management

Treatment

Clinical Specialty

Dermatology

Family Practice

Pediatrics

Intended Users

Physicians

Guideline Objective(s)

- To address the management of adolescent and adult patients who present with acne vulgaris (AV)
- To discuss various acne treatments, including topical therapies, systemic agents, physical modalities, including lasers and photodynamic therapy
- To review grading and classification systems for AV, microbiology and endocrinology testing, complementary/alternative therapies, and the role of diet

Note: This guideline does not examine the treatment of acne sequelae (e.g., scarring or postinflammatory dyschromia).

Target Population

Adolescents and adults who present with acne vulgaris

Interventions and Practices Considered

Classification/Evaluation

Use of consistent classification/grading scale

Microbiologic testing

Endocrinologic testing

Management/Treatment

Topical therapy

- Benzoyl peroxide
- Topical antibiotics (erythromycin and clindamycin)
- Topical retinoids (tretinoin, adapalene, tazarotene)
- Azelaic acid
- Dapsone
- Salicylic acid
- Combination topical agents

Systemic antibiotics

- Tetracyclines (tetracycline, minocycline, doxycycline)
- Macrolide antibiotics (azithromycin, erythromycin)
- Trimethoprim (with or without sulfamethoxazole)

Hormonal agents

- Combined oral contraceptives
- Spironolactone
- Flutamide
- Oral corticosteroids

Isotretinoin

Miscellaneous therapy

- Chemical peels
- Intralesional steroids

Complementary/alternative therapy

- Tea tree oil
- Herbal agents
- Biofeedback

Dietary restrictions (not recommended)

Major Outcomes Considered

- Accuracy, reliability, and sensitivity of acne grading and classification systems
- Usefulness of endocrinologic and microbiologic testing
- Number of lesions
- Severity of lesions
- Sebum levels
- Recurrence rate
- Quality of life
- Psychological and emotional improvement
- Adverse effects of treatment

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

An evidence-based model was used and evidence was obtained using a systematic search of PubMed and the Cochrane Library database from May 2006 through September 2014 for clinical questions addressed in the previous version of this guideline published in 2007, and 1964 to 2014 for all newly identified clinical questions. Searches were prospectively limited to publications in the English language. Medical Subject Headings (MeSH) terms and strings used in various combinations in the literature search included: acne or acne vulgaris combined with treatment, therapy, prevention, prophylaxis, grading, classification, scoring, microbiology, endocrinology, hormone, topical, retinoid, benzoyl peroxide (BP), antibiotic, doxycycline, minocycline, tetracycline, macrolide, erythromycin, azithromycin, trimethoprim (with or without sulfamethoxazole), oral contraceptives, antiandrogen, corticosteroid, isotretinoin, peel, complementary, alternative, herbal, diet, glycemic index, milk, antioxidants, probiotics, and fish oil. Additional studies were identified by hand-searching bibliographies of publications, including reviews and meta-analyses.

Inclusion Criteria

Type of study:

Control of exposure: interventional, observational

Timing: prospective, retrospective

Design: evidence-based clinical guidelines, systematic reviews and meta-analyses, randomized controlled trials, non-randomized clinical trials, cross-sectional studies and cohort studies, case control studies, case reports

Outcomes:

Preference for outcomes that matter to patients and help them live longer or better lives (reduced mortality, symptom improvement, improved quality of life, increased safety, etc.)

Depending on the clinical question, disease-oriented evidence outcomes were also considered (measurement of intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes (e.g., blood loss, chemistry, anesthetic plasma levels, physiologic function, etc.).

Language: Studies only in English

Publication: Full-text available

Exclusion Criteria

Type of study: animal studies, in-vitro research, letters

Outcomes: No patient-oriented outcomes measured

Language: Non-English studies

Publication: Only abstract or no abstract

Number of Source Documents

A total of 1145 abstracts were initially assessed for possible inclusion; 242 were retained for final review based on relevancy and the highest level of available evidence for the outlined clinical questions. (See the "Description of Methods to Formulate the Recommendation" field for the list of clinical questions.)

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Evidence was graded using a three-point scale based on the quality of methodology and the overall focus of the study as follows:

Good-quality patient-oriented evidence (i.e., evidence measuring outcomes that matter to patients: morbidity, mortality, symptom improvement, cost reduction, and quality of life)

Limited-quality patient-oriented evidence

Other evidence, including consensus guidelines, opinion, case studies, or disease-oriented evidence (i.e., evidence measuring intermediate, physiologic, or surrogate end points that may or may not reflect improvements in patient outcomes)

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Evidence tables were generated for the identified studies and used by the work group in developing recommendations. In addition, the evidence tables generated for the Academy's previous acne guideline were also used by the work group. The Academy's previous published guidelines on acne were also evaluated, as were other current published guidelines on acne. Relevant references published after September 2014 are provided solely as supplemental supporting text information for recommendations as derived from the systematic search, and to address comments received during the guideline review and approval process.

The available evidence was evaluated using a unified system called the Strength of Recommendation Taxonomy (SORT) developed by editors of the United States (U.S.) family medicine and primary care journals (i.e., *American Family Physician*, *Family Medicine*, *Journal of Family Practice*, and *BMJ USA*).

Evidence was graded using a 3-point scale based on the quality of methodology (e.g., randomized control trial, case control, prospective/retrospective cohort, case series, etc) and the overall focus of the study (i.e., diagnosis, treatment/prevention/screening, or prognosis) (see the "Rating Scheme for the Strength of the Evidence" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

A work group of 17 recognized acne experts, 1 general practitioner, 1 pediatrician, and 1 patient was convened to determine the scope of the guideline and identify clinical questions in the diagnosis and management of acne vulgaris.

Clinical questions used to structure the evidence review:

What systems are most commonly used for the grading and classification of adult acne and acne vulgaris in adolescents (11-21 years of age) to adults?

What is the role of microbiologic and endocrine testing in evaluating patients with adult acne and acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of topical agents in the treatment of adult acne and acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of systemic antibacterial agents in the treatment of adult acne and acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of hormonal agents in the treatment of adult acne and acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of isotretinoin in the treatment of adult acne and acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of physical modalities for the treatment of acne vulgaris in adolescents to adults?

What is the effectiveness and what are the potential side effects of complementary/alternative therapies in the treatment of adult acne and acne vulgaris in adolescents to adults?

What is the role of diet in adult acne in adolescents to adults?

See Table 1 in the original guideline document for further details on clinical questions.

Clinical recommendations were developed on the best available evidence tabled in the guideline. In those situations where documented evidence-based data were not available or were showing inconsistent or limited conclusions, expert opinion and medical consensus was used to generate clinical recommendations.

Rating Scheme for the Strength of the Recommendations

Strength of the Recommendations

Recommendation based on consistent and good-quality patient-oriented evidence

Recommendation based on inconsistent or limited-quality patient-oriented evidence

Recommendation based on consensus, opinion, case studies, or disease-oriented evidence

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

Internal Peer Review

Description of Method of Guideline Validation

These guidelines have been developed in accordance with the American Academy of Dermatology (AAD)/American Academy of Dermatology Association "Administrative Regulations for Evidence-Based Clinical Practice Guidelines" (version approved August 2012), which include the opportunity for review and comment by the entire AAD membership and final review and approval by the AAD Board of Directors.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Abulnaja KO. Changes in the hormone and lipid profile of obese adolescent Saudi females with acne vulgaris. *Braz J Med Biol Res.* 2009 Jun;42(6):501-5. [PubMed](#)

Adebamowo CA, Spiegelman D, Berkey CS, Danby FW, Rockett HH, Colditz GA, Willett WC, Holmes MD. Milk consumption and acne in adolescent girls. *Dermatol Online J.* 2006 May 30;12(4):1. [PubMed](#)

Adebamowo CA, Spiegelman D, Berkey CS, Danby FW, Rockett HH, Colditz GA, Willett WC, Holmes MD. Milk consumption and acne in teenaged boys. *J Am Acad Dermatol.* 2008 May;58(5):787-93. [PubMed](#)

Agarwal US, Besarwal RK, Bhola K. Oral isotretinoin in different dose regimens for acne vulgaris: a

randomized comparative trial. Indian J Dermatol Venereol Leprol. 2011 Nov-Dec;77(6):688-94. [PubMed](#)

Akman A, Durusoy C, Senturk M, Koc CK, Soyuturk D, Alpsoy E. Treatment of acne with intermittent and conventional isotretinoin: a randomized, controlled multicenter study. Arch Dermatol Res. 2007 Dec;299(10):467-73. [PubMed](#)

Alhusayen RO, Juurlink DN, Mamdani MM, Morrow RL, Shear NH, Dormuth CR, Canadian Drug Safety and Effectiveness Research Network. Isotretinoin use and the risk of inflammatory bowel disease: a population-based cohort study. J Invest Dermatol. 2013 Apr;133(4):907-12. [PubMed](#)

Allen BS, Smith JG Jr. Various parameters for grading acne vulgaris. Arch Dermatol. 1982 Jan;118(1):23-5. [PubMed](#)

Amichai B, Shemer A, Grunwald MH. Low-dose isotretinoin in the treatment of acne vulgaris. J Am Acad Dermatol. 2006 Apr;54(4):644-6. [PubMed](#)

Arora MK, Seth S, Dayal S. The relationship of lipid profile and menstrual cycle with acne vulgaris. Clin Biochem. 2010 Dec;43(18):1415-20. [PubMed](#)

Bassett IB, Pannowitz DL, Barnetson RS. A comparative study of tea-tree oil versus benzoylperoxide in the treatment of acne. Med J Aust. 1990 Oct 15;153(8):455-8. [PubMed](#)

Becker LE, Bergstresser PR, Whiting DA, Clendenning WE, Dobson RL, Jordan WP, Abell E, LeZotte LA, Pochi PE, Shupack JL, Sigafos RB, Stoughton RB, Voorhees JJ. Topical clindamycin therapy for acne vulgaris. A cooperative clinical study. Arch Dermatol. 1981 Aug;117(8):482-5. [PubMed](#)

Bergman H, Tsai KY, Seo SJ, Kvedar JC, Watson AJ. Remote assessment of acne: the use of acne grading tools to evaluate digital skin images. Telemed J E Health. 2009 Jun;15(5):426-30. [PubMed](#)

Bernstein JE, Shalita AR. Topically applied erythromycin in inflammatory acne vulgaris. J Am Acad Dermatol. 1980 Apr;2(4):318-21. [PubMed](#)

Bershad S, Rubinstein A, Paterniti JR, Le NA, Poliak SC, Heller B, Ginsberg HN, Fleischmajer R, Brown WV. Changes in plasma lipids and lipoproteins during isotretinoin therapy for acne. N Engl J Med. 1985 Oct 17;313(16):981-5. [PubMed](#)

Beylot C, Chivot M, Faure M, Pawin H, Poli F, Revuz J, Auffret N, Moyse D, DrÃ©no B, Groupe Expert AcnÃ©. Inter-observer agreement on acne severity based on facial photographs. J Eur Acad Dermatol Venereol. 2010 Feb;24(2):196-8. [PubMed](#)

Borghi A, Mantovani L, Minghetti S, Giari S, Virgili A, Bettoli V. Low-cumulative dose isotretinoin treatment in mild-to-moderate acne: efficacy in achieving stable remission. J Eur Acad Dermatol Venereol. 2011 Sep;25(9):1094-8. [PubMed](#)

Bozdag KE, GÃ¼lseren S, GÃ¼lven F, Cam B. Evaluation of depressive symptoms in acne patients treated with isotretinoin. J Dermatolog Treat. 2009;20(5):293-6. [PubMed](#)

Bradford LG, Montes LF. Topical application of vitamin A acid in acne vulgaris. South Med J. 1974 Jun;67(6):683-7. [PubMed](#)

Bunker CB, Newton JA, Kilborn J, Patel A, Conway GS, Jacobs HS, Greaves MW, Dowd PM. Most women with acne have polycystic ovaries. Br J Dermatol. 1989 Dec;121(6):675-80. [PubMed](#)

Burke BM, Cunliffe WJ. The assessment of acne vulgaris--the Leeds technique. *Br J Dermatol*. 1984 Jul;111(1):83-92. [PubMed](#)

Castelo-Branco C, Moyano D, GÃ³mez O, Balasch J. Long-term safety and tolerability of flutamide for the treatment of hirsutism. *Fertil Steril*. 2009 Apr;91(4):1183-8. [PubMed](#)

Chia CY, Lane W, Chibnall J, Allen A, Siegfried E. Isotretinoin therapy and mood changes in adolescents with moderate to severe acne: a cohort study. *Arch Dermatol*. 2005 May;141(5):557-60. [PubMed](#)

Choi CW, Choi JW, Park KC, Youn SW. Ultraviolet-induced red fluorescence of patients with acne reflects regional casual sebum level and acne lesion distribution: qualitative and quantitative analyses of facial fluorescence. *Br J Dermatol*. 2012 Jan;166(1):59-66. [PubMed](#)

Choi CW, Choi JW, Youn SW. Subjective facial skin type, based on the sebum related symptoms, can reflect the objective casual sebum level in acne patients. *Skin Res Technol*. 2013 May;19(2):176-82. [PubMed](#)

Choi CW, Lee DH, Kim HS, Kim BY, Park KC, Youn SW. The clinical features of late onset acne compared with early onset acne in women. *J Eur Acad Dermatol Venereol*. 2011 Apr;25(4):454-61. [PubMed](#)

Christiansen JV, Gadborg E, Ludvigsen K, Meier CH, Norholm A, Pedersen D, Rasmussen KA, Reiter H, Reyman F, Sylvest B, Unna P, Wehnert R, Holm P. Topical tretinoin, vitamin A acid (Ainol) in acne vulgaris. A controlled clinical trial. *Dermatologica*. 1974;148(2):82-9. [PubMed](#)

Cohen J, Adams S, Patten S. No association found between patients receiving isotretinoin for acne and the development of depression in a Canadian prospective cohort. *Can J Clin Pharmacol*. 2007;14(2):e227-33. [PubMed](#)

Collins MK, Moreau JF, Opel D, Swan J, Prevost N, Hastings M, Bimla Schwarz E, Korb Ferris L. Compliance with pregnancy prevention measures during isotretinoin therapy. *J Am Acad Dermatol*. 2014 Jan;70(1):55-9. [PubMed](#)

Cook CH, Centner RL, Michaels SE. An acne grading method using photographic standards. *Arch Dermatol*. 1979 May;115(5):571-5. [PubMed](#)

Cove JH, Cunliffe WJ, Holland KT. Acne vulgaris: is the bacterial population size significant. *Br J Dermatol*. 1980 Mar;102(3):277-80. [PubMed](#)

Crockett SD, Gulati A, Sandler RS, Kappelman MD. A causal association between isotretinoin and inflammatory bowel disease has yet to be established. *Am J Gastroenterol*. 2009 Oct;104(10):2387-93. [PubMed](#)

Crockett SD, Porter CQ, Martin CF, Sandler RS, Kappelman MD. Isotretinoin use and the risk of inflammatory bowel disease: a case-control study. *Am J Gastroenterol*. 2010 Sep;105(9):1986-93. [PubMed](#)

Cunliffe WJ, Caputo R, DrÃ©no B, FÃ¼rstrÃ¶m L, Heenen M, Orfanos CE, Privat Y, Robledo Aguilar A, Meynadier J, Alirezai M, Jablonska S, Shalita A, Weiss JS, Chalker DK, Ellis CN, Greenspan A, Katz HI, Kantor I, Millikan LE, Swinehart JM, Swinyer L, Whitmore C, Czernielewski J, Verschoore M. Clinical efficacy and safety comparison of adapalene gel and tretinoin gel in the treatment of acne vulgaris: Europe and U.S. multicenter trials. *J Am Acad Dermatol*. 1997;36(6 Pt 2):S126-S134. [PubMed](#)

Cunliffe WJ, Holland KT. Clinical and laboratory studies on treatment with 20% azelaic acid cream for acne. *Acta Derm Venereol Suppl (Stockh)*. 1989;143:31-4. [PubMed](#)

De Marchi MA, Maranhão RC, Brandizzi LI, Souza DR. Effects of isotretinoin on the metabolism of triglyceride-rich lipoproteins and on the lipid profile in patients with acne. *Arch Dermatol Res*. 2006 Mar;297(9):403-8. [PubMed](#)

Di Landro A, Cazzaniga S, Parazzini F, Ingordo V, Cusano F, Atzori L, Cutraro FT, Musumeci ML, Zinetti C, Pezzarossa E, Bettoli V, Caproni M, Lo Scocco G, Bonci A, Bencini P, Naldi L, GISED Acne Study Group. Family history, body mass index, selected dietary factors, menstrual history, and risk of moderate to severe acne in adolescents and young adults. *J Am Acad Dermatol*. 2012 Dec;67(6):1129-35. [PubMed](#)

Dobrev H. Fluorescence diagnostic imaging in patients with acne. *Photodermatol Photoimmunol Photomed*. 2010 Dec;26(6):285-9. [PubMed](#)

Doshi A, Zaheer A, Stiller MJ. A comparison of current acne grading systems and proposal of a novel system. *Int J Dermatol*. 1997 Jun;36(6):416-8. [PubMed](#)

Draelos ZD, Carter E, Maloney JM, Elewski B, Poulin Y, Lynde C, Garrett S, United States/Canada Dapsone Gel Study Group. Two randomized studies demonstrate the efficacy and safety of dapsone gel, 5% for the treatment of acne vulgaris. *J Am Acad Dermatol*. 2007 Mar;56(3):439.e1-10. [PubMed](#)

DrÃ©no B, Fischer TC, Perosino E, Poli F, Viera MS, Rendon MI, Berson DS, Cohen JL, Roberts WE, Starker I, Wang B. Expert opinion: efficacy of superficial chemical peels in active acne management--what can we learn from the literature today? Evidence-based recommendations. *J Eur Acad Dermatol Venereol*. 2011 Jun;25(6):695-704. [PubMed](#)

DrÃ©no B, Khammari A, Orain N, Noray C, MÃ©rial-Kieny C, MÃ©ry S, Nocera T. ECCA grading scale: an original validated acne scar grading scale for clinical practice in dermatology. *Dermatology*. 2007;214(1):46-51. [PubMed](#)

DrÃ©no B, Poli F, Pawin H, Beylot C, Faure M, Chivot M, Auffret N, Moyse D, Ballanger F, Revuz J. Development and evaluation of a Global Acne Severity Scale (GEA Scale) suitable for France and Europe. *J Eur Acad Dermatol Venereol*. 2011 Jan;25(1):43-8. [PubMed](#)

Dunlap FE, Mills OH, Tuley MR, Baker MD, Plott RT. Adapalene 0.1% gel for the treatment of acne vulgaris: its superiority compared to tretinoin 0.025% cream in skin tolerance and patient preference. *Br J Dermatol*. 1998 Oct;139 Suppl 52:17-22. [PubMed](#)

Enshaieh S, Jooya A, Siadat AH, Iraj F. The efficacy of 5% topical tea tree oil gel in mild to moderate acne vulgaris: a randomized, double-blind placebo-controlled study. *Indian J Dermatol Venereol Leprol*. 2007 Jan-Feb;73(1):22-5. [PubMed](#)

Etminan M, Bird ST, Delaney JA, Bressler B, Brophy JM. Isotretinoin and risk for inflammatory bowel disease: A nested case-control study and meta-analysis of published and unpublished data. *Unknown*. February 2013;149(2):216-220. [16 references]

Fenner JA, Wiss K, Levin NA. Oral cephalixin for acne vulgaris: clinical experience with 93 patients. *Pediatr Dermatol*. 2008 Mar-Apr;25(2):179-83. [PubMed](#)

Fitz-Gibbon S, Tomida S, Chiu BH, Nguyen L, Du C, Liu M, Elashoff D, Erfe MC, Loncaric A, Kim J, Modlin RL, Miller JF, Sodergren E, Craft N, Weinstock GM, Li H. *Propionibacterium acnes* strain populations in the human skin microbiome associated with acne. *J Invest Dermatol*. 2013 Sep;133(9):2152-60. [PubMed](#)

Fouladi RF. Aqueous extract of dried fruit of *Berberis vulgaris* L. in acne vulgaris, a clinical trial. *J Diet Suppl.* 2012 Dec;9(4):253-61. [PubMed](#)

Fyrand O, Jakobsen HB. Water-based versus alcohol-based benzoyl peroxide preparations in the treatment of acne vulgaris. *Dermatologica.* 1986;172(5):263-7. [PubMed](#)

Galvin SA, Gilbert R, Baker M, Guibal F, Tuley MR. Comparative tolerance of adapalene 0.1% gel and six different tretinoin formulations. *Br J Dermatol.* 1998 Oct;139 Suppl 52:34-40. [PubMed](#)

Garner SE, Eady A, Bennett C, Newton JN, Thomas K, Popescu CM. Minocycline for acne vulgaris: efficacy and safety. *Cochrane Database Syst Rev.* 2012 Aug 15;(8):CD002086. [PubMed](#)

Gold LS, Cruz A, Eichenfield L, Tan J, Jorizzo J, Kerrouche N, Dhuin JC. Effective and safe combination therapy for severe acne vulgaris: a randomized, vehicle-controlled, double-blind study of adapalene 0.1%-benzoyl peroxide 2.5% fixed-dose combination gel with doxycycline hyclate 100 mg. *Cutis.* 2010 Feb;85(2):94-104. [PubMed](#)

Goldsmith LA, Bolognia JL, Callen JP, Chen SC, Feldman SR, Lim HW, Lucky AW, Reed BR, Siegfried EC, Thiboutot DM, Wheeland RG, American Academy of Dermatology. American Academy of Dermatology Consensus Conference on the safe and optimal use of isotretinoin: summary and recommendations [published erratum appears in *J Am Acad Derm* 2004;51:348]. *J Am Acad Dermatol.* 2004 Jun;50(6):900-6. [4 references] [PubMed](#)

Goldstein JA, Socha-Szott A, Thomsen RJ, Pochi PE, Shalita AR, Strauss JS. Comparative effect of isotretinoin and etretinate on acne and sebaceous gland secretion. *J Am Acad Dermatol.* 1982 Apr;6(4 Pt 2 Suppl):760-5. [PubMed](#)

Grover C, Reddu BS. The therapeutic value of glycolic acid peels in dermatology. *Indian J Dermatol Venereol Leprol.* 2003 Mar-Apr;69(2):148-50. [PubMed](#)

Gupta MA, Johnson AM, Gupta AK. The development of an Acne Quality of Life scale: reliability, validity, and relation to subjective acne severity in mild to moderate acne vulgaris. *Acta Derm Venereol.* 1998 Nov;78(6):451-6. [PubMed](#)

Hayashi N, Akamatsu H, Kawashima M, Acne Study Group. Establishment of grading criteria for acne severity. *J Dermatol.* 2008 May;35(5):255-60. [PubMed](#)

Hayashi N, Suh DH, Akamatsu H, Kawashima M, Acne Study Group. Evaluation of the newly established acne severity classification among Japanese and Korean dermatologists. *J Dermatol.* 2008 May;35(5):261-3. [PubMed](#)

Holland C, Mak TN, Zimny-Arndt U, Schmid M, Meyer TF, Jungblut PR, Bräggemann H. Proteomic identification of secreted proteins of *Propionibacterium acnes*. *BMC Microbiology.* 2010 Aug 27;10:230. [PubMed](#)

Hughes H, Brown BW, Lawlis GF, Fulton JE Jr. Treatment of acne vulgaris by biofeedback relaxation and cognitive imagery. *J Psychosom Res.* 1983;27(3):185-91. [PubMed](#)

Hunt MJ, Barnetson RS. A comparative study of gluconolactone versus benzoyl peroxide in the treatment of acne. *Australas J Dermatol.* 1992;33(3):131-4. [PubMed](#)

Ilknur T, Demirtasoglu M, BiÅşak MU, Ozkan S. Glycolic acid peels versus amino fruit acid peels for acne. *J Cosmet Laser Ther*. 2010 Oct;12(5):242-5. [PubMed](#)

Ismail NH, Manaf ZA, Azizan NZ. High glycemic load diet, milk and ice cream consumption are related to acne vulgaris in Malaysian young adults: a case control study. *BMC Dermatol*. 2012 Aug 16;12:13. [PubMed](#)

Jen I. A comparison of low dosage trimethoprim/sulfamethoxazole with oxytetracycline in acne vulgaris. *Cutis*. 1980 Jul;26(1):106-8. [PubMed](#)

Jick SS, Kremers HM, Vasilakis-Scaramozza C. Isotretinoin use and risk of depression, psychotic symptoms, suicide, and attempted suicide. *Arch Dermatol*. 2000 Oct;136(10):1231-6. [PubMed](#)

Jones DH, King K, Miller AJ, Cunliffe WJ. A dose-response study of 13-cis-retinoic acid in acne vulgaris. *Br J Dermatol*. 1983 Mar;108(3):333-43. [PubMed](#)

Jones EL, Crumley AF. Topical erythromycin vs blank vehicle in a multiclinic acne study. *Arch Dermatol*. 1981 Sep;117(9):551-3. [PubMed](#)

Kakita L. Tazarotene versus tretinoin or adapalene in the treatment of acne vulgaris. *J Am Acad Dermatol*. 2000 Aug;43(2 Pt 3):S51-4. [PubMed](#)

Katsambas A, Graupe K, Stratigos J. Clinical studies of 20% azelaic acid cream in the treatment of acne vulgaris. Comparison with vehicle and topical tretinoin. *Acta Derm Venereol Suppl (Stockh)*. 1989;143:35-9. [PubMed](#)

Kaymak Y, Ilter N. The effectiveness of intermittent isotretinoin treatment in mild or moderate acne. *J Eur Acad Dermatol Venereol*. 2006 Nov;20(10):1256-60. [PubMed](#)

Kermani TA, Ham EK, Camilleri MJ, Warrington KJ. Polyarteritis nodosa-like vasculitis in association with minocycline use: a single-center case series. *Semin Arthritis Rheum*. 2012 Oct;42(2):213-21. [PubMed](#)

Kim MK, Choi SY, Byun HJ, Huh CH, Park KC, Patel RA, Shinn AH, Youn SW. Comparison of sebum secretion, skin type, pH in humans with and without acne. *Arch Dermatol Res*. 2006 Aug;298(3):113-9. [PubMed](#)

Krishnan G. Comparison of two concentrations of tretinoin solution in the topical treatment of acne vulgaris. *Practitioner*. 1976 Jan;216(1291):106-9. [PubMed](#)

Kuhlman DS, Callen JP. A comparison of clindamycin phosphate 1 percent topical lotion and placebo in the treatment of acne vulgaris. *Cutis*. 1986 Sep;38(3):203-6. [PubMed](#)

Kwon HH, Yoon JY, Hong JS, Jung JY, Park MS, Suh DH. Clinical and histological effect of a low glycaemic load diet in treatment of acne vulgaris in Korean patients: a randomized, controlled trial. *Acta Derm Venereol*. 2012 May;92(3):241-6. [PubMed](#)

Lalla JK, Nandedkar SY, Paranjape MH, Talreja NB. Clinical trials of ayurvedic formulations in the treatment of acne vulgaris. *J Ethnopharmacol*. 2001 Nov;78(1):99-102. [PubMed](#)

Lasek RJ, Chren MM. Acne vulgaris and the quality of life of adult dermatology patients. *Arch Dermatol*. 1998 Apr;134(4):454-8. [PubMed](#)

Lawrence DM, Katz M, Robinson TW, Newman MC, McGarrigle HH, Shaw M, Lachelin GC. Reduced sex hormone binding globulin and derived free testosterone levels in women with severe acne. Clin Endocrinol (Oxf). 1981 Jul;15(1):87-91. [PubMed](#)

Layton AM, Knaggs H, Taylor J, Cunliffe WJ. Isotretinoin for acne vulgaris--10 years later: a safe and successful treatment. Br J Dermatol. 1993 Sep;129(3):292-6. [PubMed](#)

Leachman SA, Insogna KL, Katz L, Ellison A, Milstone LM. Bone densities in patients receiving isotretinoin for cystic acne. Arch Dermatol. 1999 Aug;135(8):961-5. [PubMed](#)

Lebrun-Vignes B, Kreft-Jais C, Castot A, Chosidow O, French Network of Regional Centers of Pharmacovigilance. Comparative analysis of adverse drug reactions to tetracyclines: results of a French national survey and review of the literature. Br J Dermatol. 2012 Jun;166(6):1333-41. [PubMed](#)

Lee JW, Yoo KH, Park KY, Han TY, Li K, Seo SJ, Hong CK. Effectiveness of conventional, low-dose and intermittent oral isotretinoin in the treatment of acne: a randomized, controlled comparative study. Br J Dermatol. 2011 Jun;164(6):1369-75. [PubMed](#)

Lehucher-Ceyrac D, de La Salmonière P, Chastang C, Morel P. Predictive factors for failure of isotretinoin treatment in acne patients: results from a cohort of 237 patients. Dermatology. 1999;198(3):278-83. [PubMed](#)

Lehucher-Ceyrac D, Weber-Buisset MJ. Isotretinoin and acne in practice: a prospective analysis of 188 cases over 9 years. Dermatology. 1993;186(2):123-8. [PubMed](#)

Levine RM, Rasmussen JE. Intralesional corticosteroids in the treatment of nodulocystic acne. Arch Dermatol. 1983 Jun;119(6):480-1. [PubMed](#)

Leyden J, Thiboutot DM, Shalita AR, Webster G, Washenik K, Strober BE, Shupack J. Comparison of tazarotene and minocycline maintenance therapies in acne vulgaris: a multicenter, double-blind, randomized, parallel-group study. Arch Dermatol. 2006 May;142(5):605-12. [PubMed](#)

Leyden JJ, Bruce S, Lee CS, Ling M, Sheth PB, Stewart DM, Werschler WP, Gilbert RD, Kircik L. A randomized, phase 2, dose-ranging study in the treatment of moderate to severe inflammatory facial acne vulgaris with doxycycline calcium. J Drugs Dermatol. 2013 Jun 1;12(6):658-63. [PubMed](#)

Leyden JJ, Hickman JG, Jarratt MT, Stewart DM, Levy SF. The efficacy and safety of a combination benzoyl peroxide/clindamycin topical gel compared with benzoyl peroxide alone and a benzoyl peroxide/erythromycin combination product. J Cutan Med Surg. 2001 Jan-Feb;5(1):37-42. [PubMed](#)

Leyden JJ, Shalita AR, Saatjian GD, Sefton J. Erythromycin 2% gel in comparison with clindamycin phosphate 1% solution in acne vulgaris. J Am Acad Dermatol. 1987 Apr;16(4):822-7. [PubMed](#)

Lomholt HB, Kilian M. Population genetic analysis of *Propionibacterium acnes* identifies a subpopulation and epidemic clones associated with acne. PLoS ONE. 2010 Aug 19;5(8):e12277. [PubMed](#)

Lookingbill DP, Chalker DK, Lindholm JS, Katz HI, Kempers SE, Huerter CJ, Swinehart JM, Schelling DJ, Klauda HC. Treatment of acne with a combination clindamycin/benzoyl peroxide gel compared with clindamycin gel, benzoyl peroxide gel and vehicle gel: combined results of two double-blind investigations. J Am Acad Dermatol. 1997 Oct;37(4):590-5. [PubMed](#)

Lucky AW, Barber BL, Girman CJ, Williams J, Ratterman J, Waldstreicher J. A multirater validation study to assess the reliability of acne lesion counting. J Am Acad Dermatol. 1996 Oct;35(4):559-65. [PubMed](#)

Lucky AW, Biro FM, Simbartl LA, Morrison JA, Sorg NW. Predictors of severity of acne vulgaris in young adolescent girls: results of a five-year longitudinal study. *J Pediatr*. 1997 Jan;130(1):30-9. [PubMed](#)

Lucky AW, Koltun W, Thiboutot D, Niknian M, Sampson-Landers C, Korner P, Marr J. A combined oral contraceptive containing 3-mg drospirenone/ 20-microg ethinyl estradiol in the treatment of acne vulgaris: a randomized, double-blind, placebo-controlled study evaluating lesion counts and participant self-assessment. *Cutis*. 2008 Aug;82(2):143-50. [PubMed](#)

Lucky AW, Maloney JM, Roberts J, Taylor S, Jones T, Ling M, Garrett S, Dapsone Gel Long-Term Safety Study Group. Dapsone gel 5% for the treatment of acne vulgaris: safety and efficacy of long-term (1 year) treatment. *J Drugs Dermatol*. 2007 Oct;6(10):981-7. [PubMed](#)

Lucky AW, McGuire J, Rosenfield RL, Lucky PA, Rich BH. Plasma androgens in women with acne vulgaris. *J Invest Dermatol*. 1983 Jul;81(1):70-4. [PubMed](#)

Lucky AW. Endocrine aspects of acne. *Pediatr Clin North Am*. 1983 Jun;30(3):495-9. [PubMed](#)

Mallon E, Newton JN, Klassen A, Stewart-Brown SL, Ryan TJ, Finlay AY. The quality of life in acne: a comparison with general medical conditions using generic questionnaires. *Br J Dermatol*. 1999 Apr;140(4):672-6. [PubMed](#)

Maloney JM, Dietze P, Watson D, Niknian M, Lee-Rugh S, Sampson-Landers C, Korner P. A randomized controlled trial of a low-dose combined oral contraceptive containing 3 mg drospirenone plus 20 microg ethinylestradiol in the treatment of acne vulgaris: lesion counts, investigator ratings and subject self-assessment. *J Drugs Dermatol*. 2009 Sep;8(9):837-44. [PubMed](#)

Maloney JM, Dietze P, Watson D, Niknian M, Lee-Rugh S, Sampson-Landers C, Korner P. Treatment of acne using a 3-milligram drospirenone/20-microgram ethinyl estradiol oral contraceptive administered in a 24/4 regimen: a randomized controlled trial. *Obstet Gynecol*. 2008 Oct;112(4):773-81. [PubMed](#)

Margolis DJ, Fanelli M, Hoffstad O, Lewis JD. Potential association between the oral tetracycline class of antimicrobials used to treat acne and inflammatory bowel disease. *Am J Gastroenterol*. 2010 Dec;105(12):2610-6. [PubMed](#)

Martin AR, Lookingbill DP, Botek A, Light J, Thiboutot D, Girman CJ. Health-related quality of life among patients with facial acne -- assessment of a new acne-specific questionnaire. *Clin Exp Dermatol*. 2001 Jul;26(5):380-5. [PubMed](#)

Mills O Jr, Thornsberry C, Cardin CW, Smiles KA, Leyden JJ. Bacterial resistance and therapeutic outcome following three months of topical acne therapy with 2% erythromycin gel versus its vehicle. *Acta Derm Venereol*. 2002;82(4):260-5. [PubMed](#)

Mills OH Jr, Kligman AM, Pochi P, Comite H. Comparing 2.5%, 5%, and 10% benzoyl peroxide on inflammatory acne vulgaris. *Int J Dermatol*. 1986 Dec;25(10):664-7. [PubMed](#)

Min S, Kong HJ, Yoon C, Kim HC, Suh DH. Development and evaluation of an automatic acne lesion detection program using digital image processing. *Skin Res Technol*. 2013 Feb;19(1):e423-32. [PubMed](#)

Miura Y, Ishige I, Soejima N, Suzuki Y, Uchida K, Kawana S, Eishi Y. Quantitative PCR of *Propionibacterium acnes* DNA in samples aspirated from sebaceous follicles on the normal skin of subjects with or without acne. *J Med Dent Sci*. 2010 Mar;57(1):65-74. [PubMed](#)

Mourelatos K, Eady EA, Cunliffe WJ, Clark SM, Cove JH. Temporal changes in sebum excretion and

propionibacterial colonization in preadolescent children with and without acne. *Br J Dermatol.* 2007 Jan;156(1):22-31. [PubMed](#)

Nader S, Rodriguez-Rigau LJ, Smith KD, Steinberger E. Acne and hyperandrogenism: impact of lowering androgen levels with glucocorticoid treatment. *J Am Acad Dermatol.* 1984 Aug;11(2 Pt 1):256-9. [PubMed](#)

NevoralovĀi Z, DvorĀikovĀi D. Mood changes, depression and suicide risk during isotretinoin treatment: a prospective study. *Int J Dermatol.* 2013 Feb;52(2):163-8. [PubMed](#)

Paranjpe P, Kulkarni PH. Comparative efficacy of four Ayurvedic formulations in the treatment of acne vulgaris: a double-blind randomised placebo-controlled clinical evaluation. *J Ethnopharmacol.* 1995 Dec 15;49(3):127-32. [PubMed](#)

Peck GL, Olsen TG, Butkus D, Pandya M, Arnaud-Battandier J, Gross EG, Windhorst DB, Cheripko J. Isotretinoin versus placebo in the treatment of cystic acne. A randomized double-blind study. *J Am Acad Dermatol.* 1982 Apr;6(4 Pt 2 Suppl):735-45. [PubMed](#)

Plewig G, Cunliffe WJ, Binder N, HĀĳschen K. Efficacy of an oral contraceptive containing EE 0.03 mg and CMA 2 mg (Belara) in moderate acne resolution: a randomized, double-blind, placebo-controlled Phase III trial. *Contraception.* 2009 Jul;80(1):25-33. [PubMed](#)

Pochi PE, Shalita AR, Strauss JS, Webster SB, Cunliffe WJ, Katz HI, Kligman AM, Leyden JJ, Lookingbill DP, Plewig G, et al. Report of the Consensus Conference on Acne Classification. Washington, D.C., March 24 and 25, 1990. *J Am Acad Dermatol.* 1991 Mar;24(3):495-500. [12 references] [PubMed](#)

Potter RA. Intralesional triamcinolone and adrenal suppression in acne vulgaris. *J Invest Dermatol.* 1971 Dec;57(6):364-70. [PubMed](#)

Preneau S, Dessinioti C, Nguyen JM, Katsambas A, DrĀĉno B. Predictive markers of response to isotretinoin in female acne. *Eur J Dermatol.* 2013 Jul-Aug;23(4):478-86. [PubMed](#)

Qureshi AA, Brandling-Bennett HA, Giberti S, McClure D, Halpern EF, Kvedar JC. Evaluation of digital skin images submitted by patients who received practical training or an online tutorial. *J Telemed Telecare.* 2006;12(2):79-82. [PubMed](#)

Rafiei R, Yaghoobi R. Azithromycin versus tetracycline in the treatment of acne vulgaris. *J Dermatolog Treat.* 2006;17(4):217-21. [PubMed](#)

Rapp SR, Feldman SR, Graham G, Fleischer AB, Brenes G, Dailey M. The Acne Quality of Life Index (Acne-QOLI): development and validation of a brief instrument. *Am J Clin Dermatol.* 2006;7(3):185-92. [PubMed](#)

Reddy D, Siegel CA, Sands BE, Kane S. Possible association between isotretinoin and inflammatory bowel disease. *Am J Gastroenterol.* 2006 Jul;101(7):1569-73. [PubMed](#)

Rehn LM, Meririnne E, HĀĳĳk-Nikanne J, IsometsĀ E, Henriksson M. Depressive symptoms and suicidal ideation during isotretinoin treatment: a 12-week follow-up study of male Finnish military conscripts. *J Eur Acad Dermatol Venereol.* 2009 Nov;23(11):1294-7. [PubMed](#)

Richter JR, FĀĳrstrĀĳm LR, Kiistala UO, Jung EG. Efficacy of the fixed 1.2% clindamycin phosphate, 0.025% tretinoin gel formulation (Velac) and a proprietary 0.025% tretinoin gel formulation (Aberela) in the topical control of facial acne. *J Eur Acad Dermatol Venereol.* 1998 Nov;11(3):227-33. [PubMed](#)

Rubinow DR, Peck GL, Squillace KM, Gantt GG. Reduced anxiety and depression in cystic acne patients after successful treatment with oral isotretinoin. *J Am Acad Dermatol*. 1987 Jul;17(1):25-32. [PubMed](#)

Sato K, Matsumoto D, Iizuka F, Aiba-Kojima E, Watanabe-Ono A, Suga H, Inoue K, Gonda K, Yoshimura K. Anti-androgenic therapy using oral spironolactone for acne vulgaris in Asians. *Aesthetic Plast Surg*. 2006 Nov-Dec;30(6):689-94. [PubMed](#)

Schutte H, Cunliffe WJ, Forster RA. The short-term effects of benzoyl peroxide lotion on the resolution of inflamed acne lesions. *Br J Dermatol*. 1982 Jan;106(1):91-4. [PubMed](#)

Shaheen B, Gonzalez M. A microbial aetiology of acne: what is the evidence?. *Br J Dermatol*. 2011 Sep;165(3):474-85. [PubMed](#)

Shahlita AR, Smith EB, Bauer E. Topical erythromycin v clindamycin therapy for acne. A multicenter, double-blind comparison. *Arch Dermatol*. 1984 Mar;120(3):351-5. [PubMed](#)

Shalita A, Weiss JS, Chalker DK, Ellis CN, Greenspan A, Katz HI, Kantor I, Millikan LE, Swinehart T, Swinyer L, Whitmore C, Baker M, Czernielewski J. A comparison of the efficacy and safety of adapalene gel 0.1% and tretinoin gel 0.025% in the treatment of acne vulgaris: a multicenter trial. *J Am Acad Dermatol*. 1996 Mar;34(3):482-5. [PubMed](#)

Shalita AR, Chalker DK, Griffith RF, Herbert AA, Hickman JG, Maloney JM, Miller BH, Tschen EH, Chandraratna RA, Gibson JR, Lew-Kaya DA, Lue JC, Sefton J. Tazarotene gel is safe and effective in the treatment of acne vulgaris: a multicenter, double-blind, vehicle-controlled study. *Cutis*. 1999 Jun;63(6):349-54. [PubMed](#)

Shalita AR. Treatment of mild and moderate acne vulgaris with salicylic acid in an alcohol-detergent vehicle. *Cutis*. 1981 Nov;28(5):556-8, 561. [PubMed](#)

Shaw JC. Low-dose adjunctive spironolactone in the treatment of acne in women: a retrospective analysis of 85 consecutively treated patients. *J Am Acad Dermatol*. 2000 Sep;43(3):498-502. [PubMed](#)

Shin J, Cheetham TC, Wong L, Niu F, Kass E, Yoshinaga MA, Sorel M, McCombs JS, Sidney S. The impact of the iPLEDGE program on isotretinoin fetal exposure in an integrated health care system. *J Am Acad Dermatol*. 2011 Dec;65(6):1117-25. [PubMed](#)

Smith R, Mann N, Mäkelä H, Roper J, Braue A, Varigos G. A pilot study to determine the short-term effects of a low glycemic load diet on hormonal markers of acne: a nonrandomized, parallel, controlled feeding trial. *Mol Nutr Food Res*. 2008 Jun;52(6):718-26. [PubMed](#)

Smith RN, Mann NJ, Braue A, Mäkelä H, Varigos GA. The effect of a high-protein, low glycemic-load diet versus a conventional, high glycemic-load diet on biochemical parameters associated with acne vulgaris: a randomized, investigator-masked, controlled trial. *J Am Acad Dermatol*. 2007 Aug;57(2):247-56. [PubMed](#)

Stainforth JM, Layton AM, Taylor JP, Cunliffe WJ. Isotretinoin for the treatment of acne vulgaris: which factors may predict the need for more than one course?. *Br J Dermatol*. 1993 Sep;129(3):297-301. [PubMed](#)

Strauss JS, Leyden JJ, Lucky AW, Lookingbill DP, Drake LA, Hanifin JM, Lowe NJ, Jones TM, Stewart DM, Jarratt MT, Katz I, Pariser DM, Pariser RJ, Tschen E, Chalker DK, Rafal ES, Savin RP, Roth HL, Chang LK, Baginski DJ, Kempers S, McLane J, Eberhardt D, Leach EE, Bryce G, Hong J. A randomized trial of the efficacy of a new micronized formulation versus a standard formulation of isotretinoin in patients with severe recalcitrant nodular acne. *J Am Acad Dermatol*. 2001 Aug;45(2):187-95. [PubMed](#)

Strauss JS, Leyden JJ, Lucky AW, Lookingbill DP, Drake LA, Hanifin JM, Lowe NJ, Jones TM, Stewart DM, Jarratt MT, Katz I, Pariser DM, Pariser RJ, Tschen E, Chalker DK, Rafal ES, Savin RP, Roth HL, Chang LK, Baginski DJ, Kempers S, McLane J, Eberhardt D, Leach EE, Bryce G, Hong J. Safety of a new micronized formulation of isotretinoin in patients with severe recalcitrant nodular acne: A randomized trial comparing micronized isotretinoin with standard isotretinoin. *J Am Acad Dermatol*. 2001 Aug;45(2):196-207. [PubMed](#)

Strauss JS, Rapini RP, Shalita AR, Konecky E, Pochi PE, Comite H, Exner JH. Isotretinoin therapy for acne: results of a multicenter dose-response study. *J Am Acad Dermatol*. 1984 Mar;10(3):490-6. [PubMed](#)

Strauss JS, Stranieri AM. Changes in long-term sebum production from isotretinoin therapy. *J Am Acad Dermatol*. 1982 Apr;6(4 Pt 2 Suppl):751-6. [PubMed](#)

Sundstr m A, Alfredsson L, S  lin-Forsberg G, Gerd n B, Bergman U, Jokinen J. Association of suicide attempts with acne and treatment with isotretinoin: retrospective Swedish cohort study. *BMJ*. 2010 Nov 11;341:c5812. [PubMed](#)

Tan J, Wolfe B, Weiss J, Stein-Gold L, Bikowski J, Del Rosso J, Webster GF, Lucky A, Thiboutot D, Wilkin J, Leyden J, Chren MM. Acne severity grading: determining essential clinical components and features using a Delphi consensus. *J Am Acad Dermatol*. 2012 Aug;67(2):187-93. [PubMed](#)

Tan JK, Fung K, Bulger L. Reliability of dermatologists in acne lesion counts and global assessments. *J Cutan Med Surg*. 2006 Jul-Aug;10(4):160-5. [PubMed](#)

Tan JK, Jones E, Allen E, Pripotnev S, Raza A, Wolfe B. Evaluation of essential clinical components and features of current acne global grading scales. *J Am Acad Dermatol*. 2013 Nov;69(5):754-61. [PubMed](#)

Tan JK, Tang J, Fung K, Gupta AK, Thomas DR, Sapra S, Lynde C, Poulin Y, Gulliver W, Sebaldt RJ. Development and validation of a comprehensive acne severity scale. *J Cutan Med Surg*. 2007 Nov-Dec;11(6):211-6. [PubMed](#)

Tanghetti E, Harper JC, Oefelein MG. The efficacy and tolerability of dapsone 5% gel in female vs male patients with facial acne vulgaris: gender as a clinically relevant outcome variable. *J Drugs Dermatol*. 2012 Dec;11(12):1417-21. [PubMed](#)

Timpatanapong P, Rojanasakul A. Hormonal profiles and prevalence of polycystic ovary syndrome in women with acne. *J Dermatol*. 1997 Apr;24(4):223-9. [PubMed](#)

Tochio T, Tanaka H, Nakata S, Ikeno H. Accumulation of lipid peroxide in the content of comedones may be involved in the progression of comedogenesis and inflammatory changes in comedones. *J Cosmet Dermatol*. 2009 Jun;8(2):152-8. [PubMed](#)

Tomida S, Nguyen L, Chiu BH, Liu J, Sodergren E, Weinstock GM, Li H. Pan-genome and comparative genome analyses of propionibacterium acnes reveal its genomic diversity in the healthy and diseased human skin microbiome. *MBio*. 2013 Apr 30;4(3):e00003-13. [PubMed](#)

Tschen EH, Katz HI, Jones TM, Monroe EW, Kraus SJ, Connolly MA, Levy SF. A combination benzoyl peroxide and clindamycin topical gel compared with benzoyl peroxide, clindamycin phosphate, and vehicle in the treatment of acne vulgaris. *Cutis*. 2001 Feb;67(2):165-9. [PubMed](#)

Wang HS, Wang TH, Soong YK. Low dose flutamide in the treatment of acne vulgaris in women with or without oligomenorrhea or amenorrhea. *Changeng Yi Xue Za Zhi*. 1999 Sep;22(3):423-32. [PubMed](#)

Webster GF, Berson D, Stein LF, Fivenson DP, Tanghetti EA, Ling M. Efficacy and tolerability of once-daily tazarotene 0.1% gel versus once-daily tretinoin 0.025% gel in the treatment of facial acne vulgaris: a randomized trial. *Cutis*. 2001 Jun;67(6 Suppl):4-9. [PubMed](#)

Webster GF, Leyden JJ, Gross JA. Comparative pharmacokinetic profiles of a novel isotretinoin formulation (isotretinoin-Lidose) and the innovator isotretinoin formulation: a randomized, 4-treatment, crossover study. *J Am Acad Dermatol*. 2013 Nov;69(5):762-7. [PubMed](#)

Xhaufaire-Uhoda E, Piñard GE. Skin capacitance imaging of acne lesions. *Skin Res Technol*. 2007 Feb;13(1):9-12. [PubMed](#)

Youn SH, Choi CW, Choi JW, Youn SW. The skin surface pH and its different influence on the development of acne lesion according to gender and age. *Skin Res Technol*. 2013 May;19(2):131-6. [PubMed](#)

Youn SW, Kim JH, Lee JE, Kim SO, Park KC. The facial red fluorescence of ultraviolet photography: is this color due to *Propionibacterium acnes* or the unknown content of secreted sebum?. *Skin Res Technol*. 2009 May;15(2):230-6. [PubMed](#)

Zane C, Capezzera R, Pedretti A, Facchinetti E, Calzavara-Pinton P. Non-invasive diagnostic evaluation of phototherapeutic effects of red light phototherapy of acne vulgaris. *Photodermatol Photoimmunol Photomed*. 2008 Oct;24(5):244-8. [PubMed](#)

Zech LA, Gross EG, Peck GL, Brewer HB. Changes in plasma cholesterol and triglyceride levels after treatment with oral isotretinoin. A prospective study. *Arch Dermatol*. 1983 Dec;119(12):987-93. [PubMed](#)

Zouboulis CC, Derumeaux L, Decroix J, Maciejewska-Udziela B, Cambazard F, Stuhler A. A multicentre, single-blind, randomized comparison of a fixed clindamycin phosphate/tretinoin gel formulation (Velac) applied once daily and a clindamycin lotion formulation (Dalacin T) applied twice daily in the topical treatment of acne vulgaris. *Br J Dermatol*. 2000 Sep;143(3):498-505. [PubMed](#)

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate use of medications and other therapy to treat acne vulgaris

Potential Harms

Side effects of medication

See also the original guideline document for a thorough discussion of the side effects of each medication. See the prescribing information tables (I-XXXIII) in the original guideline document for a quick overview on adverse effects, toxicities, and drug interactions.

Contraindications

Contraindications

- In general, the use of combination oral contraceptive pills (COCs) for acne should be avoided within 2 years of first starting menses or in patients who are <14 years of age unless it is clinically warranted.
- The tetracycline class of antibiotics should be considered first-line therapy in moderate to severe acne, except when contraindicated because of other circumstances (i.e., pregnancy, ≤8 years of age, or allergy).

See the prescribing information tables (I-XXXIII) in the original guideline document for specific contraindications for recommended treatments.

Qualifying Statements

Qualifying Statements

Adherence to these guidelines will not ensure successful treatment in every situation. Furthermore, these guidelines should not be interpreted as setting a standard of care, or be deemed inclusive of all proper methods of care, nor exclusive of other methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding the propriety of any specific therapy or technique must be made by the physician and the patient in light of all the circumstances presented by the individual patient, and the known variability and biologic behavior of the disease. This guideline reflects the best available data at the time the guideline was prepared. The results of future studies may require revisions to the recommendations in this guideline to reflect new data.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Patient Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Zaenglein AL, Pathy AL, Schlosser BJ, Alikhan A, Baldwin HE, Berson DS, Bowe WP, Graber EM, Harper JC, Kang S, Keri JE, Leyden JJ, Reynolds RV, Silverberg NB, Stein Gold LF, Tollefson MM, Weiss JS, Dolan NC, Sagan AA, Stern M, Boyer KM, Bhushan R. Guidelines of care for the management of acne vulgaris. *J Am Acad Dermatol*. 2016 May;74(5):945-73.e33. [315 references] [PubMed](#)

Adaptation

Not applicable: The guideline was not adapted from another source.

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Guideline Committee

Management of Acne Vulgaris Work Group

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Financial Disclosures/Conflicts of Interest

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Work group members completed a disclosure of interests, which was periodically updated and reviewed throughout guideline development. If a potential conflict was noted, the work group member recused him or herself from discussion and drafting of recommendations pertinent to the topic area of the disclosed interest.

See the original guideline document for the list of authors' conflict of interest disclosure.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Strauss JS, Krowchuk DP, Leyden JJ, Lucky AW, Shalita AR, Siegfried EC, Thiboutot DM, Van Voorhees AS, Beutner KA, Sieck CK, Bhushan R, American Academy of Dermatology/American Academy of Dermatology. Guidelines of care for acne vulgaris management. J Am Acad Dermatol. 2007 Apr;56(4):651-63. [180 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from [Journal of the American Academy of Dermatology Web site](#) .

Availability of Companion Documents

The following is available:

American Academy of Dermatology (AAD) guideline development process. Schaumburg (IL): American Academy of Dermatology (AAD). Available from the [American Academy of Dermatology \(AAD\) Web site](#) .

Patient Resources

A variety of resources about acne are available from the [American Academy of Dermatology \(AAD\) Web site](#) .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them

better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

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